

There are inserted in this part of the work the elements of the solar and lunar eclipses which will happen in the year 1855. Tables are also given, by means of which the solar eclipses may be accurately computed for any assigned place. These tables are founded on a modification of Bessel's formulæ suggested by Mr. T. Safford, jun.

Tables are given for calculating the occultations of all the stars down to the *sixth magnitude*, contained in the Catalogue of the British Association, which can be occulted during the year 1855. The method of Bessel forms the basis of computation.

In addition to the usual list of eclipses, &c. of *Jupiter's* satellites, a complete set of tables is given, by the aid of which the configuration of the satellites corresponding to *any assignable time* may be readily ascertained.

There is a table by Dr. B. A. Gould, containing the geographical positions of the principal observatories which are at present in astronomical activity, or which have been so within the last quarter of a century. The latest and most trustworthy determinations have been employed in its preparation. The following is the position assigned to the Washington Observatory:—N. Lat. $38^{\circ} 53' 39'' \cdot 25$ (*Ast. Journal*, iii. 12); Long. W. from Greenwich, as derived from data of the U.S. Coast Survey up to 1852, $5^{\text{h}} 8^{\text{m}} 11^{\text{s}} \cdot 2$.

The Appendix, in addition to other matters of less importance, contains Chauvenet's tables for correcting lunar distances and an ephemeris of *Neptune* for the year 1853.

Various individuals have co-operated in the computation of this Ephemeris. The results have in most instances passed under the final revision of Prof. Peirce.

It may be remarked, in conclusion, that the work is beautifully got up. The order of arrangement is neat and lucid; the printing is in a clear bold type, and the paper is of superior quality. The modern style of numerals is used throughout, apparently without any disadvantage.

Upon the probable Identity of the Solar Faculæ with the rose-coloured Protuberances seen during a Total Eclipse of the Sun. By M. Schweizer, Astronomer of the Institute of Geodesy, Moscow. (*Ast. Nach.* No. 849, p. 133.)

In an account of the total eclipse of the sun of August 8, 1850, observed at Honolulu, M. Arago threw out a conjecture relative to the possible identity of the solar faculæ with the red protuberances seen around the margin of the moon during the occurrence of the totality.* M. Schweizer was induced by this circumstance to institute a series of observations of the solar faculæ about the time of the total eclipse of July 28, 1851, and to cause drawings of their appearances to be carefully executed by some of the most

* *Comptes Rendus*, April 21, 1851.

expert pupils of the Institute.* The observations were made with a Fraunhofer instrument of 3·3 inches aperture, and a magnifying power of 55. They were commenced on the 9th of July, and were continued till some time after the occurrence of the eclipse. Of the whole series of drawings, a select set, amounting to twelve in number, and representing the appearances of the faculæ during the few days which elapsed before and after the eclipse, were lithographed for the purpose of wider diffusion. A copy of these drawings accompanies the number of the *Astronomische Nachrichten*, containing M. Schweizer's communication. By comparing these drawings with the accounts of the protuberances seen during the total eclipse of July 28, M. Schweizer shows that a remarkable analogy exists between the latter phenomena and those to which the drawings relate. Thus, with respect to the hook-shaped protuberance, seen by all observers of the eclipse on the western limb of the sun, at a distance of about 279° from the north pole of the solar disk, counting towards the east, there was found upon the drawings a *similarly-formed* facula, having the *same position*, which continued from the morning of the 26th of July, when it was first seen, to approach nearer and nearer the margin of the sun's disk, and *had already quitted it on the 28th*, in virtue of the sun's rotation. An equally satisfactory agreement was found to present itself upon comparing the drawings of the faculæ with the descriptions of the isolated red patch seen in the vicinity of the hooked protuberance, and also in several other similar instances. M. Schweizer sums up the results of his comparison in the following terms:—

1. For every group of faculæ which appeared on the *western* margin of the sun's disk within two days *before* the eclipse, and for every group which appeared on the *eastern* margin within a similarly short time *after* the eclipse, and which were demonstrated by the drawings not to be on the sun's disk on the 28th of July, corresponding protuberances were seen.

2. Notwithstanding the rather sudden changes of form to which faculæ are subject, still there were several of them which presented a striking resemblance in this respect to the corresponding protuberances.

3. On the western border of the sun the *configuration* of a hooked, a round, and an elongated protuberance, was exactly the same as that of the corresponding and similarly-formed faculæ.

M. Schweizer remarks, that it is difficult to suppose so striking a coincidence to be purely accidental, and that the probability rather is, that the protuberances are no other than the faculæ which we so often see upon the sun's disk. This conclusion might be objected to by some persons, on the ground that the light of the faculæ is generally more intense than that of the other parts of the solar surface, while, on the other hand, the protuberances shine only by a moderate red light. M. Schweizer, however, seems to

* M. Schweizer states that the pupils of the Institute are habitually instructed in drawing from a very early age.

think that there are circumstances connected with the appearance of the faculæ which serve to obviate this objection.

First, he asserts it to be a well-known fact, that even bright groups of faculæ, as they advance from the eastern border of the sun towards the middle of the disk, now and then vanish, and even seem to reappear in altered forms after they have passed the middle parts of the disk. Again he states, that both himself and his assistants have remarked that the faculæ, although occasionally quite visible when they are *just upon the edge of the sun's disk*, still are, at other times, much less conspicuous in that position than at *some distance* from the edge. He estimates the maximum brightness of the faculæ to be in those parts of the disk which are situate at a distance of from $\frac{1}{2}'$ to $5'$ or $6'$ from the margin. Hence it would appear, that the brightness of the faculæ depends on the position which they occupy with respect to the imaginary line uniting the centre of the sun and the eye of the observer. "Might it not then be easily possible," he says, "that as, in the middle of the sun's disk, so also upon its margin, where the radius forms a right angle with the line before-mentioned, the light of the faculæ should not surpass the rest of the solar surface? nay, might it not descend in intensity to the light of the protuberances? The light of the latter cannot be so inconsiderable, since they continued to be seen, according to some accounts of the eclipse, for a considerable time after the reappearance of the sun.* If this be really the case, it is probable that the cloud-like faculæ merely represent transparent objects, in a small degree or even not at all self-luminous, which allow the sun's light to pass in certain positions, with respect to the eye of the observer, without being themselves visible; in other positions, to transmit to us a maximum of the solar light, either by refraction or reflexion, with such intensity that they appear brighter than the surrounding parts of the surface; and finally, in other positions, to appear with the mild light and colour of the protuberances."

Without taking into account the impossibility of a mere accidental coincidence of the drawings of the faculæ with the protuberances, M. Schweizer sought to establish a connexion between the latter and the penumbrae of the solar spots; but he was unable to arrive at any consistent results. During the days immediately preceding and following the eclipse the number of such penumbrae visible upon the disk was too small to account for the numerous protuberances, and even of those penumbrae or nuclei which *did* appear, not one, however small, was situate *exactly upon the margin of the disk*, as ought to have resulted if they had been identical with the protuberances, and as really occurred in the case of the faculæ. Moreover, the forms of the protuberances do not in anywise resemble those of the penumbrae seen near the margin of the solar disk; while, on the other hand, any person who has observed the

* In Mr. Dawes' account of the eclipse there occurs the following remarkable statement relative to the hooked protuberance:—"To my great astonishment, this marvellous object continued visible for about 5^s , as nearly as I could judge, after the sun began to reappear." (*Monthly Notice*, vol. xii.; *Memoirs*, vol. xxi.)—R. G.

solar faculæ, and has seen M. Fearnley's admirable drawing of the total eclipse, cannot fail to be struck with the resemblance between the forms of the protuberances and those of the faculæ, more especially in the case of the vein-like shoots which gradually lose themselves in the surface of the disk.

In No. 849 of the *Astronomische Nachrichten* there appear observations by Mr. Hind of two variable small stars, which he discovered at Mr. Bishop's observatory in the year 1848. The two stars are situate very near to each other. The following are their positions :—

	R.A.	N.P.D.	
	^h ^m ^s	[°] ['] ^{''}	
Preceding Star	7 34 2	66 12 2	(1850)
Following Star	7 40 18	65 53 8	

Mr. Hind concludes from his observations that the preceding star was at a maximum (though not so bright as in previous years) about the middle of December 1852, and that the following star was also at a maximum towards the middle of November. He estimates the periods at 280 and 290 days respectively, but he is of opinion that all the observations he has hitherto made are hardly sufficient to settle them within several days.

THETIS.

M. Schoenfeld, of Bonn, has investigated new elements of this planet, and has employed the results in computing an ephemeris for the opposition of 1853, which extends from May 16 to September 21 (*Ast. Nach.* No. 848, p. 119).

COMET (I.) 1850.

For observations of this comet made at the Cape of Good Hope by Mr. Maclear, between September 6 and October 15, 1850, see *Ast. Nach.* No. 852, p. 181.

IRENE.

M. Trattenero, of Padua, has determined new elements of this planet, and has calculated an ephemeris for the opposition of 1853, extending from October 1, 1853, to January 20, 1854 (*Ast. Nach.* No. 852, p. 191).

ERRATA.

Page 70, line 14, for R^2 , read K^2 .

— — — 27, for $\sqrt{\frac{1}{4}K^2 - M^2}$, read $\sqrt{\frac{1}{4}K^4 - M^2}$.

— 93, — 29, dele Sir.

— 97, — 2, for Ross, read Roy.

— 126, — 36, for them, read three.

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